BANGALORE WATER SUPPLY AND SEWERAGE BOARD

Office of the CE (Project)

Cauvery Bhavan III Floor, Bangalore 560009

No. BWSSB/CE(P)/ACE (P)-1,2/ACE(Cst-DCW)/ 330 /2025-26 Dt: 23.05.2025

Addendum No. 1

Name of the Work: Design, Engineering, Construction and Commissioning of Wastewater Treatment Plants with Tertiary Treatment Facility and Intermediate Sewage Pumping Station along with Operation & Maintenance thereof for Ten Years for Byatarayanapura Zone (DBO Mode) in 110 Village Areas (Phase-II) Under Karnataka Water Security and Disaster Resilience Program (KWSDRP) – (Contract Package No. BWSSB CE-P/KWSDRP/WBS-II-A).

Ref: 1.Tender Notification NO. BWSSB/CE(P)/ACE(P)-1,2/ACE(Cst-DCW)/110/2025-26 Dtd:24.04.2025

2. INDENT No. BWSSB/2025-26/WT/WORK_INDENT2252

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In continuation to the above Tender Notification cited under reference, an Addendum-I with respect to subject tender work is issued as below:

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Amendment in Volumes be referred as under

Sr. No	Tender Ref.	Existing Contents of Tender Document	Amended
1.	**Volume 1, 3 Qualification of the Tenderer: Clause no. 3.1.2 (b) (i), Page. No. 11 of 178**	**3.1.2 Particular Construction Experience** **(b) Experience in Key Activities:** The Tenderers shall provide evidence that it has a minimum experience in the following key activities, **(i) Experience in Execution of WwTPs** i. The Tenderer as a sole entity or a Lead Partner and or Partner in a Joint Venture shall have successfully completed, including Design, Procurement, Supply, Installation, Construction, Testing, and Commissioning of all Civil, Mechanical, Electrical, and Instrumentation Works of minimum One (1) No. WwTP of 12 MLD capacity and above or Two (2) Nos. Waste Water Treatment Plants of minimum 6 MLD capacity with Biological Nutrient Removal (BNR) technology of process like, A2O, EA, IFAS, MBBR, SBR, with SCADA Integration, to meet effluent standard as BOD ≤ 10 mg/L, COD ≤ 50 mg/L, TSS ≤ 10 mg/L, TN ≤ 10 mg/L, TP ≤ 1 mg/L and fecal coliform < 100MPN/100ml should be in operation for a period of one year during the last 5 years as on date of Bid submission. **Note:** 1. Tenderer must submit the MOU with Technology provider for proposed process technology (SBR/ IFAS/ MBBR) under this contract, failing which the Tender will be considered as technically non-responsive. 2. Technology provider shall provide the evidence that he has successfully supplied the technology for at least 1 (One) WWTP same as 3.1.2 (b)(i).	**3.1.2 Particular Construction Experience** **(b) Experience in Key Activities:** The Tenderers shall provide evidence that it has a minimum experience in the following key activities, **(i) Experience in Execution of WwTPs** i. The Tenderer as a sole entity or a Lead Partner and or Partner in a Joint Venture shall have successfully completed, including Design, Procurement, Supply, Installation, Construction, Testing, and Commissioning of all Civil, Mechanical, Electrical, and Instrumentation Works of minimum One (1) No. WwTP of 12 MLD capacity and above or Two (2) Nos. Waste Water Treatment Plants of minimum 6 MLD capacity with Biological Nutrient Removal (BNR) technology of process like, A2O, EA, IFAS, MBBR, SBR, with SCADA Integration, to meet effluent standard as BOD ≤ 10 mg/L, COD ≤ 50 mg/L, TSS ≤ 20 mg/L, TN ≤ 10 mg/L, TP ≤ 1 mg/L should be in operation for a period of one year during the last 5 years as on date of Bid submission. **Note:** 1. Tenderer must submit the MOU with Technology provider for proposed process technology (SBR/ IFAS/ MBBR) under this contract, failing which the Tender will be considered as technically non-responsive. 2. Technology provider shall provide the evidence that he has successfully supplied the technology same as 3.1.2 (b)(i). 3. If any bidder proposes to use their own in-house SBR/IFAS/MBBR technology, they must clearly demonstrate that the technology is bidders proprietary and has been successfully implemented as defined in Tender Clause No.

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			3.1.2 (b)(i). The bidder shall also confirm that the SBR Decanter including SCADA system / IFAS media system / MBBR media system has been entirely designed and manufactured by bidder and has not been sourced from any third-party technology provider. Supporting documents including performance certificates, client references, and detailed documentation shall be submitted along with the bid. In such case, MoU with a third-party technology provider is not required. 4. The Parameters defined in clause 3.1.2 shall be at the outlet of the STP / WwTP. 5. For the purpose of pre-qualification, WwTPs/STPs executed by Bidder as defined in Tender Clause No. 3.1.2 (b)(i) based on the MBR process may also be considered. For the execution, the contractor shall execute the works strictly based on the processes as defined in the Tender document.
2.	**Volume-2 / Section-7, Cl. No. 8.18, Part 8 -82 to Part 8-101**	**8.18 Aeration system with allied Equipments** **8.18.1 Tubular Type Diffusers** **&** **8.18.15.2 Diffuser system for IFAS** Fine Bubble Diffuser Detail to be used for IFAS shall be as per the below requirement, only fine bubble PU membrane diffusers shall be acceptable with minimum membrane diffuser to floor coverage area of 8%. Diffusers shall be submerged fine bubble / fine pore, high transfer efficiency, low maintenance, non-buoyant type. Diffusers shall be strip (membrane) type. Material of construction for (entire under water system including accessories shall be of non-corrosive Complete diffuser as a unit shall be assembled at the manufacturing factory level. The grid supports shall be made of SS 304. **8.18.15.3 Type of Diffuser System**	**Shall be read as** **8.18 Aeration system with allied Equipments** **8.18.1 Tubular Type Diffusers (IFAS/SBR/MBBR /Extended Aeration).** **Diffuser specification shall be common for all type of Process as per Cl. no. 8.18.1.** **And the Clause No. 8.18.15.2 to 8.18.15.6 Shall be read as Deleted from the Bid Specification.**

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		A fine bubble diffused aeration system shall be applied to aeration tank for oxygenation. The number of diffuser elements can be varied by the bidder depending on the manufacturer selected, subject to the condition that sufficient design calculations are attached along with it and the manufacturer is a standard one having supplied the diffusers to various wastewater treatment plants of similar nature in the installing country. **8.18.15.4 Diffuser Elements** The diffuser elements shall be membrane type and resistant to such ingredients as hydrocarbons, oil and grease. This shall afford a high oxygen transfer rate coupled with a minimal pressure drop besides permitting simple erection onto the horizontal air manifold. They shall have minimal coupling / attachments to the air manifold and shall have self-cleaning. properties while in action. Flat surfaces facing upwards as membrane surfaces shall only be accepted. The diffuser unit shall be of corrosion resistant material. The membrane diffusers shall permit connection to the air manifolds of circular or square cross section and the entire lot of diffusers shall be capable of discharging designed flow of air at an average flow (maximum of summer and winter requirement) with the nominal air flow per diffuser per element shall not exceed 80 m3/h/m2 of diffuser surface area when installed in the said aeration tanks. The diffuser grid shall be of fixed type. The headers onto which the diffusers are fixed shall be of standard Imported PE/PVC/UPVC pipe sections of suitable inner bore and shape with custom fixtures of the diffuser elements as directed by the membrane manufacturers. Alternative pipe materials shall be acceptable provided the same are a mandatory part of the diffuser supplier and the sub-headers have enough counterweight	

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		or alternative arrangement to surmount any buoyancy lift from the floor during air charging. The diffusers shall be fixed to bioreactor floor, Fine Bubble Diffused Aeration membrane diffusers with a maximum flux through the diffusers not exceeding 80 m3/m2 membrane area. The air from the blowers which shall have high temperature and should be cooled suitably to avoid damaging the diffuser membranes. The material of diffuser and associated fixtures shall be: Diffusers Membranes -PU Membranes Diffusers Membranes Support -Engineering plastics Non-Corrosive material Under water Air Piping to diffusers -UPVC/PE Air downers to underwater pipe - UPVC/PE The in-tank diffuser piping shall be sized for a velocity less than 21 m/sec. **8.18.15.5 Testing for Diffuser system** All inspection and testing shall be carried out in accordance with relevant Indian Standard and in absence of IS as per Detail Tender Specification or internationally approved equivalent standard at Manufacturer's Work. **8.18.15.6 Air Piping to Diffusers** SS Air headers are to be provided to avoid corrosion and the consequent damage to the fine bubble diffusers. System should allow acid injection and relaxation to ensure proper functioning of fine bubble diffusers.	
3.	**Volume-2 / Section-7, Part 8-83**	**8.18 Aeration system with allied Equipments** **8.18.1 Tubular Type Diffusers** (n) Provide a back flow prevention device built integrally with the diffuser that prevents backflow into the diffuser and air piping.	**Shall be read as** **8.18 Aeration system with allied Equipments** **8.18.1 Tubular Type Diffusers** (n) Diffuser shall be provided with a back flow prevention device built integrally with the diffuser that prevents

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	& Volume-2 / Section-7, Part 5-8	& **5.11 Design Requirements** • Contractor shall provide back flow prevention mechanism / check valve inside each diffuser to prevent intrusion of liquid and/or solids into the diffuser and air piping under normal operating conditions of aeration system.	backflow or Diffuser membrane slits can also act as a prevention of backflow into the diffuser. Diffuser slits automatically get closed when air supply is stopped into the diffuser and air piping. **5.11 Design Requirements** • Contractor should supply diffusers which are provide with back flow prevention device built integrally with in the diffuser that prevents backflow or Diffuser membrane slits can also act as a prevention of backflow into the diffuser. Diffuser slits automatically get closed when air supply is stopped into the diffuser and air piping.
4.	Volume-2 / Section-7, Part 5 -13	While selecting any type of pump and blower, priority shall be given to higher pump/blower efficiency and lower power consumption and shall ensure that pump/blower can operate at high efficiency throughout its service life. At minimum contractor shall ensure efficiencies of pump/blower as listed below: • Minimum efficiency of Submersible Pumps for TSPS shall be 70% • Minimum efficiency of Axial Tubular Pump (MLR) shall be 70% • Minimum efficiency of RAS Pump (Horizontal/Vertical Non-clog solid handling) shall be 65% • Minimum efficiency of Sludge Pump (Progressive Cavity/Screw pump) shall be 45%. • Minimum efficiency of Rotary Tri-Lobe blower shall be 70% • Minimum efficiency of Centrifugal Turbo blower shall be 90%	**Shall be read as** While selecting any type of pump and blower, priority shall be given to higher pump/blower efficiency and lower power consumption and shall ensure that pump/blower can operate at high efficiency throughout its service life. At minimum contractor shall ensure efficiencies of pump/blower as listed below: • Minimum efficiency of Submersible Pumps for TSPS shall be 70%. • Minimum efficiency of Axial Tubular Pump (MLR) shall be 70%. • Minimum efficiency of RAS Pump (Horizontal/Vertical/Submersible Non-clog solid handling) shall be 60%. • Minimum efficiency of Sludge Pump (Progressive Cavity/Screw pump) shall be 45%. • Minimum efficiency of Rotary Tri-Lobe blower shall be 70%. • Minimum efficiency of Centrifugal Turbo blower shall be 90%.
5.	Volume 4,	General	AutoCAD format for following drawing nos. are uploaded in

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<table>
<tr><th>Sr. No</th><th>Tender Ref.</th><th>Existing Contents of Tender Document</th><th>Amended</th></tr>
<tr><td></td><td>Drawings</td><td></td><td>Portal.
TN-KWSDRP-WBS2A-CV-3007
TN-KWSDRP-WBS2A-CV-3008</td></tr>
<tr><td>6.</td><td>Volume 1, 3 Qualification of the Tenderer: Clause no. 3.1.2 (b) (ii), Page. No. 12 of 178</td><td>3.1.2 Particular Construction Experience
(b) Experience in Key Activities: The Tenderers shall provide evidence that it has a minimum experience in the following key activities,
(ii) Construction Experience- Reuse Plant (with Tertiary Level)
The Tenderer as sole entity or lead partner and or partner in a joint venture shall provide evidence that it has successfully completed, including Design, Procurement, Supply, Installation, Construction, Testing, and Commissioning of all Civil, Mechanical, Electrical, and Instrumentation Works of minimum One (1) No. and above reuse plant of 6 MLD or Two (2) Nos. reuse plant (with Tertiary Treatment) of minimum 3 MLD capacity and should be in operation for a period of one year during the last 5 years as on date of Bid submission. The Reuse Plant (with Tertiary Treatment) have to meet following criteria for the treated effluent
<table>
<tr><th>Parameter</th><th>Unit</th><th>Specified Maximum Concentration</th></tr>
<tr><td>Turbidity</td><td>NTU</td><td>< 2.0</td></tr>
<tr><td>TDS</td><td>mg/L</td><td>< 1000</td></tr>
<tr><td>TN</td><td>mg/L</td><td>< 5.0</td></tr>
<tr><td>BOD</td><td>mg/L</td><td>< 5.0</td></tr>
<tr><td>COD</td><td>mg/L</td><td>< 30.0</td></tr>
<tr><td>TP</td><td>mg/L</td><td>< 1.0</td></tr>
<tr><td>Fecal Coliform</td><td>MPN/ 100 ml</td><td>Nil</td></tr>
</table></td><td>3.1.2 Particular Construction Experience
(b) Experience in Key Activities: The Tenderers shall provide evidence that it has a minimum experience in the following key activities,
(ii) Construction Experience- Reuse Plant (with Tertiary Level)
The Tenderer as sole entity or lead partner and or partner in a joint venture shall provide evidence that it has successfully completed, including Design, Procurement, Supply, Installation, Construction, Testing, and Commissioning of all Civil, Mechanical, Electrical, and Instrumentation Works of minimum One (1) No. and above reuse plant of 6 MLD or Two (2) Nos. reuse plant (with Tertiary Treatment) of minimum 3 MLD capacity and should be in operation for a period of one year during the last 5 years as on date of Bid submission. The Reuse Plant (with Tertiary Treatment) have to meet following criteria for the treated effluent
<table>
<tr><th>Parameter</th><th>Unit</th><th>Specified Maximum Concentration</th></tr>
<tr><td>Turbidity</td><td>NTU</td><td>< 2.0</td></tr>
<tr><td>TN</td><td>mg/L</td><td>< 10.0</td></tr>
<tr><td>BOD</td><td>mg/L</td><td>< 5.0</td></tr>
<tr><td>COD</td><td>mg/L</td><td>< 50.0</td></tr>
<tr><td>TP</td><td>mg/L</td><td>< 1.0</td></tr>
</table></td></tr>
</table>

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<table>
<tr><th>Sr. No</th><th>Tender Ref.</th><th>Existing Contents of Tender Document</th><th>Amended</th></tr>
<tr><td>7.</td><td>Volume-2 / Section-7, Cl. No. 15.20.1, Part 5-58

&

Volume-2 / Section-7, Cl.No. 8.18.16, Part8-111</td><td>15.20.1 TSPS & WwTPs Design/Sizing Criteria

<table>
<tr><td colspan="2">REUSE FACILITIES</td></tr>
<tr><td>Reuse Flow</td><td>7.5 MLD</td></tr>
<tr><td>Minimum UF Plant Recovery</td><td>95 %</td></tr>
<tr><td>Membrane Pore Size</td><td>0.01 – 0.03 µm to remove suspended solids, bacteria, and viruses</td></tr>
<tr><td>Membrane Type</td><td>Submerged (out-to-in) or Pressurized (outside in or inside-out) hollow fiber membranes, designed to handle peak plant flow conditions.</td></tr>
<tr><td>Membrane Material (MOC)</td><td>Poly-Vinyli-Dene-Fluoride (PVDF) reinforced with polyester or polypropylene backing layer. Poly-Tetra-Fluoro-Ethylene (PTFE) with woven or non-woven substrate.</td></tr>
</table>

K. PVDF Membrane with Braided

• The membrane fiber features a Braided PVDF membrane formulation cast on polyester support braid. The PVDF membrane exhibits a tight pore size distribution with a nominal pore size of 0.03 micron. This membrane formulation permits the membrane to operate at high flux rates with low fouling characteristics. In addition, the support braid is virtually unbreakable, leading to a robust product with a long serviceable membrane life.
• The fiber is braided, allowing it to go through intensive backwash cycles that are critical to maintain high flux rates</td><td>Shall be read as

15.20.1 TSPS & WwTPs Design/Sizing Criteria

<table>
<tr><td colspan="2">REUSE FACILITIES
Following requirement of the reuse facilities are amended.</td></tr>
<tr><td>Reuse Flow</td><td>The reuse flows defined in Part 5, Volume 2 / Section 7 shall be considered as a permeate flows</td></tr>
<tr><td>Minimum UF Plant Recovery</td><td>92%</td></tr>
<tr><td>Membrane Pore Size</td><td>0.01 – 0.04 µm to remove suspended solids, bacteria, and viruses</td></tr>
<tr><td>Membrane Type</td><td>Submerged (out-to-in) or Pressurized (outside-in or inside-out) hollow fiber membranes, designed to handle peak plant load conditions.</td></tr>
<tr><td>Membrane Material (MOC)</td><td>1. Poly-Vinyli-Dene-Fluoride (PVDF) reinforced with polyester or polypropylene backing layer.
2. Poly-Tetra-Fluoro-Ethylene (PTFE) with woven or non-woven substrate.
3. Poly-Vinyli-Dene-Fluoride (PVDF-100%) – Monolithic.</td></tr>
<tr><td colspan="2">All other requirements of the Reuse facilities shall remain same as per Tender Document.</td></tr>
</table>
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		and overcome sludging events. These backflush cycles, combined with the single header configuration and central aeration, allow the product to maintain high peak flux rates in high solids SUF applications up to 2000 mg/l in the tank. • The module terminology indicates the single header design and the membrane area for a fully installed module. • The centrally aerated membrane bundles form the basis of the module. The fiber supports prevent the membrane fibers from bending, particularly during installation or removal of the module. • The integrated header on the bottom of each row contains two separate chambers - one for air distribution and the other for permeate extraction and backflush. The permeate chamber is attached to a lift pipe that directs the filtrate upwards where it is led into a center collection header. A similar arrangement is used for the air distribution. • The individual membrane rows, two permeate collection headers and the two air distribution headers, are mounted on a self-supporting module frame. The membrane module is fitted with lateral permeate connections and two air distribution pipes. Furthermore, plates are mounted on the outside of the module that serve to significantly reduce clogging and enhance the flow pattern through the module.	**K. PVDF Membrane with Braided or 100% Monolithic Type** • The membrane fiber features a 100% Monolithic PVDF/Braided PVDF membrane formulation cast on polyester support braid. The PVDF membrane exhibits a tight pore size distribution with a nominal pore size of 0.04 micron. This membrane formulation permits the membrane to operate at high flux rates with low fouling characteristics. In addition, the support braid is virtually unbreakable, leading to a robust product with a long serviceable membrane life. • The fiber is braided, allowing it to go through intensive backwash cycles that are critical to maintain high flux rates and overcome sludging events. These backflush cycles, combined with the single header configuration and central aeration, allow the product to maintain high peak flux rates in high solids SUF applications up to 2000 mg/l in the tank. • The module terminology indicates the single header design and the membrane area for a fully installed module. • The centrally aerated membrane bundles form the basis of the module. The fiber supports prevent the membrane fibers from bending, particularly during installation or removal of the module. • The integrated header on the bottom of each row contains two separate chambers - one for air distribution and the other for permeate extraction and backflush. The permeate chamber is attached to a lift pipe that directs the filtrate upwards where it is led into a center collection header. A similar arrangement is used for the air distribution. • The individual membrane rows, two permeate collection headers and the two air distribution headers, are mounted on a self-supporting module frame. The membrane module is fitted

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<table>
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<tr><td></td><td></td><td></td><td>with lateral permeate connections and two air distribution pipes. Furthermore, plates are mounted on the outside of the module that serve to significantly reduce clogging and enhance the flow pattern through the module.</td></tr>
<tr><td>8.</td><td>Volume-2 / Section-7, Cl.No. 8.18.16, Pg.No. Part 8-110</td><td>8.18.16 Ultra Filtration System (Submerged/ Pressurized)
I. Single Header Design
• Some SUF membrane modules have difficulty dealing with fibrous material, which tends to clog vulnerable areas in the module leading to operating and maintenance problems. The clogging problem is common and noticeable in double header hollow fiber products at the top header, where hair and fibers that passed through the system pretreatment are forced into the potted membrane bundle by the aeration system.
• Sludging at the bottom header often occurs in some products because there is little or no air scour to remove sludge from the base potting area. In addition, membranes that are potted at both ends or held around the edges often require over sizing to allow for expansion, contraction and to prevent breakage during manufacturing. This practice causes strain under normal operating conditions particularly during aeration, which often results in membrane integrity failure and delamination.
• The SUF product consists of bundles of hollow fiber membranes potted only at the lower end of each bundle. The non-potted ends of the fibers (at the top of the bundle) are individually sealed and move freely in the liquid. The lower end of the upright membrane bundle is fixed in a foot element, with a central air nozzle to inject air into the center of the membrane bundle, the place with the greatest potential for solid accumulation.</td><td>Shall be read as
8.18.16 Ultra Filtration System (Submerged/ Pressurized)
I. Single/Double Header Design
• The SUF product consists of bundles of hollow fiber membranes potted only at the lower end of each bundle. The non-potted ends of the fibers (at the top of the bundle) are individually sealed and move freely in the liquid. The lower end of the upright membrane bundle is fixed in a foot element, with a central air nozzle to inject air into the center of the membrane bundle, the place with the greatest potential for solid accumulation.
• Single/Double header product with central aeration provides agitation from the bottom of the membrane bundle and free-floating fiber tips, allowing the fibrous materials to float free of the module.
• In this configuration provides the following advantages:
➢ Reduces clogging and sludging.
➢ Allows higher fluxes.
➢ Allows for intermittent aeration and lower aeration rates.
Submerged Membrane
<table>
<tr><th>Technical Particular</th><th>Parameters</th></tr>
<tr><td>Membrane technology</td><td>Ultrafiltration (SUF)</td></tr>
<tr><td>Membrane Type</td><td>Braided or Reinforced Hollow Fiber or 100% PVDF Monolithic</td></tr>
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Submerged Membrane
<table>
<tr><th>Technical Particular</th><th>Parameters</th></tr>
<tr><td>Membrane technology</td><td>Ultrafiltration (SUF)</td></tr>
<tr><td>Membrane Type</td><td>Braided or Reinforced Hollow Fiber</td></tr>
<tr><td>Braid / reinforced material</td><td>Polyester or if any as per vendor recommendation</td></tr>
<tr><td>Feed Temperature</td><td>20 to 38 degree C</td></tr>
<tr><td>Membrane material</td><td>PVDF</td></tr>
<tr><td>Nominal pore size</td><td>0.03 microns (maximum)</td></tr>
<tr><td>Driving force</td><td>Vacuum</td></tr>
<tr><td>Permeate flow direction</td><td>Out to-In</td></tr>
<tr><td>Nominal fiber Diameter (OD)</td><td>1.2 to 2.6 mm</td></tr>
<tr><td>pH Operating range</td><td>2.0 – 10.5</td></tr>
<tr><td>Operating temperature range</td><td>41 - 104 °F / 5 - 40 °C</td></tr>
<tr><td>Maximum backflush transmembrane pressure</td><td>9.0 psi / 0.6 bar</td></tr>
<tr><td>Maximum filtration transmembrane pressure</td><td>9.0 psi / 0.6 bar</td></tr>
</table>
</td><td>
<table>
<tr><td>Braid / reinforced material</td><td>Polyester or if any as per vendor recommendation</td></tr>
<tr><td>Feed Temperature</td><td>20 to 38 degree C</td></tr>
<tr><td>Membrane material</td><td>PVDF</td></tr>
<tr><td>Spare space for module per Train</td><td>10%</td></tr>
<tr><td>Nominal pore size</td><td>0.04 microns (maximum)</td></tr>
<tr><td>Driving force</td><td>Vacuum</td></tr>
<tr><td>Permeate flow direction</td><td>Out to-In</td></tr>
<tr><td>Nominal fiber Diameter (OD)</td><td>1.2 to 2.6 mm</td></tr>
<tr><td>pH Operating range</td><td>2.0 – 10.5</td></tr>
<tr><td>Operating temperature range</td><td>41 - 104 °F / 5 - 40 °C</td></tr>
<tr><td>Maximum backflush transmembrane pressure</td><td>9.0 psi / 0.6 bar</td></tr>
<tr><td>Maximum filtration transmembrane pressure</td><td>9.0 psi / 0.6 bar</td></tr>
<tr><td>Fiber Strength</td><td>> 600 N</td></tr>
<tr><td>Minimum Operating life for Membrane</td><td>10 years</td></tr>
<tr><td>Specific Energy Consumption kWh/m3 (Treated)</td><td>Vendor to Provide details</td></tr>
<tr><td>Individual Modules are accessible for any replacement/future modules additions</td><td>Vendor to Provide details, If Yes, provide details of provisions for Spare modules.</td></tr>
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<tr><td>Individual Modules are accessible for any replacement/future modules additions</td><td>Vendor to Provide details, If Yes, provide details of provisions for Spare modules.</td></tr>
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</td><td></td></tr>
<tr><td>9.</td><td>Volume-2 / Section-7, Cl. No. 8.18.16, Part 8-113</td><td>
8.18.16 Ultra Filtration System (Submerged/ Pressurized)

Pressurized Membrane
<table>
<tr><th>Technical Particular</th><th colspan="2">Parameters</th></tr>
<tr><td>Length of Membrane Module</td><td>mm</td><td>As per Vendor Recommendation</td></tr>
<tr><td>Width of Membrane Module</td><td>mm</td><td>As per Vendor Recommendation</td></tr>
<tr><td>Height of Membrane Module</td><td>mm</td><td>As per Vendor Recommendation</td></tr>
<tr><td>Dry Weight of Membrane Module</td><td>Kg</td><td>As per Vendor Recommendation</td></tr>
<tr><td>Maximum No. of Membrane Rows which can be installed per Module</td><td>No.</td><td>As per Vendor Recommendation</td></tr>
<tr><td>Filtration Area of each Row</td><td>m2</td><td>As per Vendor Recommendation</td></tr>
<tr><td>Filtration Area of Module</td><td>m2</td><td>As per Vendor Recommendation</td></tr>
<tr><td>Membrane Fiber Chemistry</td><td></td><td>PVDF (Braided Fiber or Hollow Fiber (Reinforced)</td></tr>
</table>
</td><td>
Shall be read as
8.18.16 Ultra Filtration System (Submerged/ Pressurized)

Pressurized Membrane
<table>
<tr><th>Technical Particular</th><th colspan="2">Parameters</th></tr>
<tr><td>Length of Membrane Module</td><td>mm</td><td>As per Vendor Recommendation</td></tr>
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</table>
</td></tr>
</table>

Team Leader
PMC : TCE - NJSEI (JV) Consultants
KWSDRP - BWSSB

CE (Project)
BWSSB

Sr. No	Tender Ref.	Existing Contents of Tender Document			Amended		
		Fiber Support Chemistry		Polyester or if any other as per Vendor Recommendation			Fiber (Reinforced)/ or 100% PVDF Monolithic
		Membrane Module Assembly		Single Header	Fiber Support Chemistry		Polyester or if any other as per Vendor Recommendation
		Membrane Module Frame or Rack Material		SS 316	Membrane Module Assembly		Single/Double Header
		Spare space for module per Train		10%	Membrane Module Frame or Rack Material		SS 316
		Nominal fiber Diameter (OD)	mm	1.2 to 2.6 mm	Spare space for module per Train		10%
		Flow Direction		Out to– In	Nominal fiber Diameter (OD)	mm	1.2 to 2.6 mm
		Nominal Pore Size	micron	0.03 microns (maximum)	Flow Direction		Out to– In
		Feed Temperature		20 to 38 degree C	Nominal Pore Size	micron	0.04 microns (maximum)
		Housing Material and Permeate Collection Tube Material		UPVC ABS, PVC, PE Manifold	Feed Temperature		20 to 38 degree C
		Permeate Connection Type		Grooved Coupling of suitable size	Housing Material and Permeate Collection Tube Material		UPVC ABS, PVC, PE Manifold
		Air Connection Type		Grooved Coupling of suitable size	Permeate Connection Type		Grooved Coupling of suitable size
		Maximum Filtration Transmembrane Pressure	Bar	0.6	Air Connection Type		Grooved Coupling of suitable size
		Maximum Back Wash/ flush Transmembrane Pressure	Bar	0.6	Maximum Filtration Transmembrane Pressure	Bar	0.6
		Acceptable Range of Cleaning pH values		2.0 – 10.5	Maximum Back Wash/ flush Transmembrane Pressure	Bar	0.6
		Lifetime Total Chlorine Exposure	ppm-hrs.	5,00,000	Acceptable Range of Cleaning pH values		2.0 – 10.5
		Maximum chlorine Concentration	mg/l	1,000 (as $NaOCl)^3$	Lifetime Total Chlorine	ppm-hrs.	5,00,000

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Sr. No	Tender Ref.	Existing Contents of Tender Document			Amended		
		Minimum Operating life for Membrane	Years	10	Exposure		
		Specific Energy Consumption	kWh/m3 (Treated)	Vendor to Provide details	Maximum chlorine Concentration	mg/l	1,000 (as $NaOCl)^3$
		Individual Modules are accessible for any replacement/future modules additions	Yes/No	Vendor to Provide details, If Yes, provide details of provisions for Spare modules.	Minimum Operating life for Membrane	Years	10
					Specific Energy Consumption	kWh/m3 (Treated)	Vendor to Provide details
					Individual Modules are accessible for any replacement/future modules additions	Yes/No	Vendor to Provide details, If Yes, provide details of provisions for Spare modules.
10.	**Volume-1 F SPECIAL CONDITIONS OF CONTRACT**				**F SPECIAL CONDITIONS OF CONTRACT** New Clause is added after clause 70 as below. **Clause No. 71, Adjustments for Changes in Legislation** The Contract Price shall be adjusted to take account of any increase or decrease in Cost resulting from a change in the Laws of the Country (including the introduction of new Laws and the repeal or modification of existing Laws) or in the judicial or official governmental interpretation of such Laws, made after the Base Date, which affect the Contractor in the performance of obligations under the Contract.		

Other conditions remain unaltered.

Team Leader
PMC : TCE - NJSEI (JV) Consultants
KWSDRP - BWSSB

Chief Engineer (P)
Bangalore Water Supply and Sewerage Board,
Bangalore

CE (Project)
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